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## INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 5

Application Number	10/716,096
Filing Date	11/18/2003
First Named Inventor	Danek et al.
Group Art Unit	
Examiner Name	
Attorney Docket Number	761C4/CPI/LB/PJS
Submission Date	

### U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
AK	A1	US-4,173,661	11-1979	Bourdon	
AK	A2	US-4,420,498	12-13-1983	Hirose et al.	
AK	A3	US-4,480,010	10-30-1984	Sasanuma et al.	
AK	A4	US-4,486,462	12-04-1984	Asahi, et al.	
AK	A5	US-4,619,748	10-28-1986	Moll, et al.	
AK	A6	US-4,629,635	12-1986	Brors	
AK	A7	US-4,683,149	7-28-1987	Suzuki, et al	
AK	A8	US-4,740,385	04-26-1988	Feuerstein et al.	
AK	A9	US-4,844,775	07-04-1989	Keeble	
AK	A10	US-4,871,421	10-03-1989	Ogle et al.	
AK	A11	US-4,874,494	10-17-1989	Ohmi et al.	
AK	A12	US-4,931,411	6-5-1990	Tigelaar et al.	
AK	A13	US-4,965,090	10-23-1990	Gartner, et al.	
AK	A14	US-4,985,372	1-15-1991	Narita	
AK	A15	US-5,000,113	03-19-1991	Wang et al.	
AK	A16	US-5,011,705	04-30-1991	Tanaka	
AK	A17	US-5,017,403	05-21-1991	Pang et al.	
AK	A18	US-5,053,245	10-01-1991	Kiyamu et al.	

### FOREIGN PATENT DOCUMENTS

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		Country Code <sup>3</sup> -Number <sup>4</sup> -Kind Code <sup>5</sup> (if known)				
AK	B1	EP 0 174 743	03-19-1986	Morton Thiokol Inc.		
AK	B2	EP 0 376 709	07-04-1990	Inoue et al		
AK	B3	EP 0 446 988	9/18/1991	Eniricerche SpA		
AK	B4	EP 0 477 990	04/1/1998	Applied Materials		
AK	B5	EP-0 545 602	6-1993	SGS THOMSON MICROELECTRONICS		

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Date Considered 9/29/04

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Substitute for form 1449A/PTO

## INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2

of 5

Application Number	10/716,096
Filing Date	11/18/2003
First Named Inventor	Danek et al.
Group Art Unit	
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AK	A19	US-5,057,185	10-1991	Thomas III et al.	
AK	A20	US-5,089,438	02-18-1992	Katz	
AK	A21	US-5,175,126	12-29-1992	Ho et al.	
AK	A22	US-5,246,881	09-21-1993	Sandhu et al.	
AK	A23	US-5,250,328	10-1993	Otto	
AK	A24	US-5,254,499	10-19-1993	Sandhu et al.	
AK	A25	US-5,271,963	12-21-1993	Eichman et al.	
AK	A26	US-5,273,783	12-28-1993	Wanner	
AK	A27	US-5,283,085	02-01-1994	Gartner et al.	
AK	A28	US-5,314,603	05-24-1994	Sugiyama et al.	
AK	A29	US-5,356,722	10-1994	Nguyen et al.	
AK	A30	US-5,378,660	02-12-1993	Ngan et al.	
AK	A31	US-5,420,076	5-1995	Lee	
AK	A32	US-5,468,687	11-1995	Carl et al.	
AK	A33	US-5,480,684	01-02-1996	Sandhu	
AK	A34	US-5,567,483	10-1996	Foster et al.	
AK	A35	US-5,569,499	10-1996	Maeda et al.	
AK	A36	US-5,576,071	11-1996	Sandhu	

### FOREIGN PATENT DOCUMENTS

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		Country Code <sup>4</sup> -Number <sup>5</sup> -Kind Code <sup>6</sup> (if known)				
AK	B6	EP-0 678 903	10-1995	Tel Yamanishi KK		
AK	B7	EP 0 711 846	5/15/1996	Applied Materials		
AK	B8	EP-0 720 214	7-1996	Applied Materials		
AK	B9	EP-0 738 002	10-1996	Texas Instruments		
AK	B10	JP 59-197131	03-12-1985	Toshiba		

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Substitute for form 1449A/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  <i>(Use as many sheets as necessary)</i>		Application Number	10/716,096		
		Filing Date	11/18/2003		
		First Named Inventor	Danek et al.		
		Group Art Unit			
		Examiner Name			
		Attorney Docket Number	761C4/CPI/LB/PJS		
Sheet	3	of	5	Submission Date	

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		Number-Kind Code <sup>2</sup> (if known)			
INK	A37	US-5,595,938	11-22-1994	Miyazaki	
INK	A38	US-5,610,106	03-15-1984	Sasanuma et al.	
INK	A39	US-5,656,337	8-1997	Park et al.	
INK	A40	US-5,698,062	12-1997	Sakamoto et al.	
INK	A41	US-5,712,193	01-1998	Hower et al.	
INK	A42	US-5,780,115	07-1998	Park et al.	
INK	A43	US-5,743,839	12-1998	Ng	
INK	A44	US-5,855,967	01-1999	Kirkpatrick	
INK	A45	US-5,880,018	03-1999	Boeck et al.	
INK	A46	US-5,972,179	10-1999	Chittipeddi et al.	
INK	A47	US-6,004,873	12-1999	Jang et al.	
INK	A48	US-6,017,818	01-2000	Lu	
INK	A49	US-6,423,201	07-2002	Mandreckar	
INK	A50	US-6,500,501	12-2002	Akram	
	A51				
	A52				
	A53				
	A54				
	A55				

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INK	B11	JP 63-229814	9/26/1988	NEC		
INK	B12	JP 02-310918	03-12-1991	Fujitsu		
INK	B13	JP 03-135018	09-04-1991	Hitachi		
INK	B14	JP 04-100,221	07-21-1992	Fujitsu		
INK	B15	JP 05-230,639	12-17-1993	Oki Electric Inc.		

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9/29/04

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Sheet	4	of	5		

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AW	B16	JP 06-120152	04-1994	Nippon Denso Co.		
AW	B17	GB-2 299 345	10-1996	Hyundai Electronics		
	B18					
	B19					
	B20					

AKA

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NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T <sup>2</sup>
JW	C1	EIZENBERG, "Chemical Vapor Deposition of TiN for ULSI applications:, Mat. Res. Symp Process, 427, 1996, Materials Research Society, p325-335	
JW	C2	PARK et al., "A Novel A1-Reflow Process Using Surface Modification by the ECR Plasma Treatment and its Application to the 256Mbit DRAM", International Electron Devices Meeting, US, New York, pp 109-112, Dec. 11, 1994	
JW	C3	RIE, et al., "Deposition of Titanium Nitride Layers by Means of Plasma-CVD," Harterei-Kolloquium 42,, October 5-10, 1986, Wiesbaden	
JW	C4	SMITH, D., "Thin-Film Deposition Principles and Practice," McGraw-Hill, Inc. Publishers, 1995, pp 423-432, 440-447 and 449-452	
JW	C5	WANG, et al., "Optimization of PVD Ti/CVD TiN Liner for 0.35 um Tungsten," Plug Technology, Mat. Res. Society Symp. Proc. 427, 1996, Materials Res. Soc. P383-387	

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